

# CAPNOGRAPHY DURING PROCEDURAL SEDATION

Changes in capnography values and waveforms may help clinicians understand a patient's level of comfort, sedation, and respiratory function during procedural sedation.<sup>1</sup>

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Normal</b>	SpO <sub>2</sub>	Normal	None required, continue sedation.
	etCO <sub>2</sub>	Normal	
	RR	Normal	
	Waveform	Normal	

**Waveform<sup>2</sup>**  
etCO<sub>2</sub> 35–45 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Physiological variability</b>	SpO <sub>2</sub>	Normal	None required, continue sedation.
	etCO <sub>2</sub>	Normal	
	RR	Normal	
	Waveform	Variable	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> 35–45 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Hyperventilation</b>	SpO <sub>2</sub>	Normal	None required, continue sedation
	etCO <sub>2</sub>	↓	
	RR	↑	Hyperventilation can be a sign of anxiety or metabolic issues <sup>3</sup>
	Waveform	Decreased amplitude and width	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Hypopneic hypoventilation</b>	SpO <sub>2</sub>	Normal	Reassess patient and continue sedation
	etCO <sub>2</sub>	↓	
	RR	↓	
	Waveform	Decreased amplitude	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Bradypneic hypoventilation</b>	SpO <sub>2</sub>	Normal	Reassess patient and continue sedation
	etCO <sub>2</sub>	↑	
	RR	↓	
	Waveform	Increased amplitude and width	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> >45 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Apnea</b>	SpO <sub>2</sub>	Normal or ↓ depending on duration	Reassess patient Use: • Stimulation • Bag mask ventilation • Reversal agents (as appropriate) Cease drug administration
	etCO <sub>2</sub>	Zero	
	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Complete airway obstruction</b>	SpO <sub>2</sub>	Normal or ↓ depending on duration	Airway patency restored with airway alignment Waveform present
	etCO <sub>2</sub>	Zero	
	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Complete laryngospasm</b>	SpO <sub>2</sub>	Normal or ↓ depending on duration	Airway not patent with airway alignment No waveform Positive pressure ventilation
	etCO <sub>2</sub>	Zero	
	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Hypopneic hypoventilation with periodic breathing</b>	SpO <sub>2</sub>	Normal or ↓	Reassess the patient Cease drug administration or reduce dosing Assess for airway obstruction Consider supplemental oxygen
	etCO <sub>2</sub>	↓	
	RR	↓	
	Waveform	Decreased amplitude	
	Other	Apneic pauses	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Partial airway obstruction</b>	SpO <sub>2</sub>	Normal or ↓	Full airway patency restored with airway alignment Reassess patient Establish IV access Consider supplemental O <sub>2</sub> Cease drug administration
	etCO <sub>2</sub>	Normal	
	RR	Variable	
	Waveform	Normal	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Partial laryngospasm</b>	SpO <sub>2</sub>	Normal or ↓ depending on duration	Airway not fully patent with airway alignment Noisy breathing and stridor persist
	etCO <sub>2</sub>	Normal	
	RR	Variable	
	Waveform	Normal	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Bronchospasm</b>	SpO <sub>2</sub>	Normal or ↓	Reassess patient Bronchodilator therapy Cease drug administration
	etCO <sub>2</sub>	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	
	RR	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	
	Waveform	Curved	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Complete airway obstruction</b>	SpO <sub>2</sub>	Normal or ↓ depending on duration	Airway patency restored with airway alignment Waveform present
	etCO <sub>2</sub>	Zero	
	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Complete laryngospasm</b>	SpO <sub>2</sub>	Normal or ↓	Airway not fully patent with airway alignment Noisy breathing and stridor persist
	etCO <sub>2</sub>	Zero	
	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Complete laryngospasm</b>	SpO <sub>2</sub>	Normal or ↓	Airway not patent with airway alignment No waveform Positive pressure ventilation
	etCO <sub>2</sub>	Zero	
	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
<b>Complete laryngospasm</b>	SpO <sub>2</sub>	Normal or ↓	Airway not patent with airway alignment No waveform Positive pressure ventilation
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	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
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Diagnosis <sup>1</sup>	Values <sup>1</sup>		Intervention <sup>1</sup>
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	RR	Zero	
	Waveform	Absent	

**Waveform<sup>1</sup>**  
etCO<sub>2</sub> <35 mmHg

1. Krauss B, Hess DR. Capnography for procedural sedation and analgesia in the emergency department. *Ann Emerg Med.* 2007;50(2):172-81. Epub Jan. 12, 2007.

2. Gravenstein JS, editor. *Capnography: Clinical Aspects.* Cambridge University Press. 2004, 2011.

3. MedicineNet.com. Definition of hyperventilation. <http://www.medicinenet.com/script/main/art.asp?articlekey=3853>. Accessed April 10, 2016.